

**REMARKS**

Claim 12 has been amended to include the following additional features:

- the structure is capable of withstanding successive regeneration phases, based on disclosure at, e.g., page 13 in the specification,
- the conduits are parallel with a longitudinal direction (X - X'), based on disclosure at, e.g., page 6 in the specification,
- the lateral faces of the filtration elements to be bonded are planar, based on the disclosure at, e.g., page 6 in the specification,
- the active portion defines a preferred axis for propagation of the thermal flux within the joint and for the orientation of the cracks that may be produced in the joint, based on the disclosure at, e.g., pages 8-9 in the specification.

Claims 13 and 14 have been amended in view of the amendment of claim 12. Claim 16 and 17 have been amended based on the disclosure at, e.g., page 12 in the specification.

Claim 19 has been amended to recite that the active portion "is arranged between the first planar lateral face and the second planar lateral face, the binding agent being in direct contact with said first and second lateral faces". Support for this feature can be found in Fig. 2, where the connection joint 17 is arranged between the opposing planar faces 24A and 24B of the filtration units 15A and 15B. This connection joint 17 comprises a binding agent 41 and central reinforcement means 43 which are embedded in this binding agent 41.

Claim 36 has been added in order to specifically cover the embodiment where the reinforcement means form a sleeve around one filtration element. Support can be found, e.g., on page 7 and in Fig. 3.

Entry of the above amendment is respectfully requested.

### **Interview with Examiner**

Applicants thank the Examiner for the telephonic interview conducted on October 12, 2010. Applicants believe that the interview was helpful in advancing the prosecution of the present application. A Statement of Substance of Interview is submitted herewith.

### **Obviousness Rejections**

Claims 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. W003/048072 (translation provided by US 7,138,168) in view of Merriman US 2,952,579 and Adiletta US 5,228,891. Claims 19, 25/19, 26, 27, 33, 34/27, 34/33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. W003/048072 (translation provided by US 7,138,168) in view of Merriman US 2,952,579. Claims 20-24, 25/20-25/24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. W003/048072 (translation provided by US 7,138,168) and US 2,952,579 as applied in claim 19 above and further in view of Adiletta US 5,228,891. Claims 28-32, 34/28-34/32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujita et al. W003/048072 (translation provided by US 7,138,168) and US 2,952,579 as applied in claim 27 above and further in view of Adiletta US 5,228,891.

Applicants respectfully submit that the present invention is not obvious over the cited art combinations, and request that the Examiner reconsider and withdraw these rejections in view of the following remarks.

1. WO 03/048072 (FUJITA) discloses a particle filter structure comprising two honeycomb segments 12 bonded together by means of a bonding layer 8. As illustrated in Figure 3, the bonding layer 8 comprises a central layer 10 located between two underlayers 9. Each

underlayer is thus directly in contact with an external side wall 7 of a segment 12. In terms of composition, thermal expansion and viscosity, each underlayer 9 is intermediary between the segments 12 and the coat 10.

Applicants wish to emphasize that FUJITA does not disclose a bonding layer comprising a reinforcement element. In the drawings, feature 3 is a through hole.

2. FUJITA belongs to the technical field of the invention, namely, the particle filters.

3. Paragraph 13 of FUJITA (see the corresponding US 2005/0079975 A1) discloses the same general arrangement as the invention:

“The present invention provides a honeycomb structure comprising a plurality of honeycomb segments bonded into one piece via a bonding layer, each segment having a number of through-holes divided from each other by porous partition walls and extending in an axial direction of the honeycomb segment.”

The following wording identification can be made between FUJITA and the present invention:

- Honeycomb segment = filtration element;
- Porous partition wall = porous filtration wall;
- Through-holes = conduits.

4. However, FUJITA discloses a bonding layer comprising a cement layer between two underlayers. More precisely, paragraph 14 of Fujita indicates:

*“In the present invention, it is preferred that the bonding layer comprises an undercoat layer formed directly on a side wall of the honeycomb segment, and it is more preferred that a part of the undercoat layer is in pores of the honeycomb segment. It is also preferred that defining a thermal expansion coefficient of the undercoat layer as  $U_t$ , a thermal expansion coefficient of*

*the honeycomb segment as "Ht" and a thermal expansion coefficient of the cement layer as "At", a relationship between "Ut", "Ht" and "At" is  $Ht \leq Ut \leq At$  or  $Ht \geq Ut \geq At$ . It is further preferred that defining a content of at least one component X constituting the cement layer as "Ax", a content of the component X in the honeycomb segment as "Hx" and a content of the component X in the undercoat layer as "Ux", a relationship between "Ax", "Hx" and "UX" is  $Hx \leq Ux \leq Ax$  or  $Hx \geq Ux \geq Ax$ . It is preferred that the cement layer and the undercoat layer are made of a cement and an undercoat agent, respectively, and a viscosity of the undercoat agent is low relative to a viscosity of the cement."*

Thus, the teaching of FUJITA is to interpose an underlayer 9 between the external side wall 7 of a segment 12 and the cement layer 10, so that stress generation at the interface between the honeycomb segment 12 and the cement layer 10 can be hindered. To this end the properties of underlayer 9 are intermediary between those of segment 7 and layer 10 in terms of concentration, thermal expansion and viscosity.

5. Thus, the invention as claimed in claim 12 departs from the structure of FUJITA in that:

- the joint comprises a reinforcement means;
- the reinforcement means is embedded in the binding agent;
- the reinforcement means comprises a active portion, which:
  - is generally of substantially planar form;
  - is arranged between the first lateral face and the second lateral face;
  - has a mesh-like structure giving to the active portion its own coherence;
  - is produced from a metal material; and

- constitutes preferred axis for propagation of the thermal flux within the joint and for the orientation of the cracks that may be produced in the joint.

6. US 2,952,579 (MERRIMAN) discloses (Figure 2) a sandwich panel structure comprising two metal sheets 2 and 3 separated by a honeycomb core 1 made of metal. Core 1 is fixed on each metal sheet 2 (3) by an adhesive layer 9 (10). Each adhesive layer 9 (10) is a composite comprising a fabric 11 imbedded within a thermosetting resin. The fabric 11 is obtained from glass fiber threads woven together.

7. MERRIMAN is not directed to a particle filter, but to a high-strength sandwich structure having a cellular metal honeycomb core between metal sheets. A person having ordinary skill in the art of particle filters would have not considered MERRIMAN.

8. The problem which MERRIMAN seeks to address is that it is typically difficult to bond the metal core to the metal sheets because only the ends of each cell of the core contact the sheets (col. 1, lines 28-33).

*"The core construction which appears the most efficient from a strength-weight ratio standpoint for the type of loads it is to resist in a sandwich structure is a cellular one wherein the axes of the cells are generally normal to the plane of the core and surface sheets. In this construction, only the ends of the individual cell walls contact the outer sheets, thus providing only a small bonding area relative to the total platform area of the sheets in which to secure the core and sheets together. As a result, it is difficult to obtain a satisfactory bond."*

Since FUJITA is bonding the sidewalls 7 (which are planar surfaces with a large surface area) of its segments to each other, one would not have combined MERRIMAN

**(which does not concern filters and instead concerns bonding a metal edge, which has very little surface area, to a metal sheet) with FUJITA without using hindsight.**

9. In addition, FUJITA is bonding the sidewalls 7 with cement layers, whereas MERRIMAN is bonding metal edges and sheets with a composite adhesive.

9.1. First solution: to strengthen the bonding between two segments of FUJITA, one would have applied the whole teaching of MERRIMAN, what would have led to replace layer 8 of FUJITA by the composite adhesive of MERRIMAN.

But, the thermosetting adhesive used in MERRIMAN is operable in the range of 100 to 250°F. This range is not compatible with a use in a particle filter subject to regeneration phase.

If the Examiner wishes, Applicants could provide evidence about the fact that, for the person having ordinary skill in the art, the capability to withstand regeneration phases implies at least the capability to withstand temperatures of 350 °F and above.

9.2. Second solution: to strengthen the bonding between two segments of FUJITA, one would have only kept, from the composite adhesive of MERRIMAN, the glass fiber fabric 11 which acts as reinforcement means.

However, if the glass fiber fabric 11 acts as reinforcement means when imbedded into a thermosetting resin, MERRIMAN does not indicate that the glass fiber fabric 11 has also this property when embedded in cement.

One would have used this fragment of the teaching of MERRIMAN only by using hindsight of the claimed solution in order to partition its teaching.

10. In addition, the reinforcement means according to the invention further comprises an active portion which is made of metal.

11. This latter characteristic is not disclosed by MERRIMAN and one would have not obtained the invention by combining FUJITA and MERRIMAN.

12. The function of the active portion of the present invention is not only to constitute preferred axis for propagation of thermal fluxes within a joint but also for propagation of the cracks in the cement, as disclosed on page 9 in the specification:

“If the levels of thermomechanical stress are too great in the structure 11, the cracks produced in the joint 17 by the relaxation of the structure 11 are orientated along the beams 47 and the cross-members 49.”

13. Neither FUJITA nor MERRIMAN treat this problem.

No prior art document establishes that the glass fiber fabric 11 disclosed by MERRIMAN exhibits such properties and can be used with such functions.

14. US 5,228,891 (ADILETTA) discloses (Figure 2) a particle filter for which exhaust gases are forced through a filter 57 located between a block of input cells and a block of output cells. The filter 57 is supported by two grids 59 made of a wire mesh. The support grid 59 retains filter 57 in position when an excessive back pressure is applied on it during use.

15. **A person having ordinary skill in the art would have no reason to substitute glass fiber fabric of the intermediary structure resulting from the modification of FUJITA in view MERRIMAN, with the grid of ADILETTA. This is because there is no link between the glass fiber fabric having a reinforcement function and the metal grid having a support function.**

16. After having selected, for its reinforcement properties, the glass fiber fabric 11 of MERRIMAN to modify the device of FUJITA, a person having ordinary skill in the art would

have not replaced it by the metal grid 59 of ADILETTA without losing the particular properties having led to the precise selection of the glass fiber fabric 11 of MERRIMAN.

Once more, a person having ordinary skill in the art would have used the grid of ADILETTA only with hindsight of the claimed invention.

17. In conclusion, the present invention is not obvious relative to FUJITA in view of MERRIMAN, or relative to FUJITA in view of MERRIMAN in view of ADILETTA.

18. In addition to the above, **neither ADILETTA nor MERRIMAN discloses reinforcement means having active portions extending in different planes in order to be opposite adjacent lateral faces of the same filtration element, as in claims 16-18 and 36.**

Nothing in the prior art documents teaches the person having ordinary skill in the art to cover several adjacent faces, particularly perpendicular faces, of one filtration element with such a reinforcement means.

19. Thus the inventions are claimed by claims 16-18 and 36 are patentable on that basis as well.

20. As to amended claim 19, which is based on Fig. 2 in the present application, it is submitted that the cited art does not teach, suggest or otherwise render obvious at least the feature of the binding agent being in direct contact with the first and second lateral faces.

That is, it is noted that in Fujita, an undercoat layer 9 is present between the cement layer 10 and sidewall 7 of the segment 12. In contrast, the binding agent in the claim 19 is in direct contact with the first and second lateral faces, without any undercoat layer in between the binding agent and the lateral faces. **Since the undercoat layer is a key feature of Fujita (see col. 3, lines 56-65), Fujita neither teaches nor suggests at least the feature of claim 19 that the binding agent is in direct contact with the first and second lateral faces.**



Accordingly, Applicants submit that the present invention is not obvious over the cited art, and withdrawal of these rejections is respectfully requested.

### Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,


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CUSTOMER NUMBER

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